EURO-CARES: European Curation of Astromaterials Returned from Exploration of Space

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The objective of the H2020-funded EURO-CARES project is to create a roadmap for the implementation of a European Extra-terrestrial Sample Curation Facility (ESCF) that would be suitable for the curation of samples from all possible return missions likely over the next few decades, to the Moon, asteroids and Mars.

Study and long-term curation of extra-terrestrial samples imply keeping the samples as clean as possible from any possible contaminants, while ensuring they remain contained in case of biohazards. The requirements for a combined high containment and ultraclean facility will naturally lead to the development of a highly specialised and unique facility that will require the development of novel scientific and engineering techniques.

EURO-CARES team work is organized around five distinct technical Work Packages (WP), led by institutions and scientists and engineers from all over Europe. These cover aspects including:

- Planetary Protection to devise an effective, legally compliant and realistic, programme while minimising risk to current scientific study and optimising access to researchers for future studies;
- Facilities and Infrastructure to define the state of the art facilities required to receive, contain and curate extra-terrestrial samples and guarantee terrestrial planetary protection;
- Instruments and Methods to determine which analyses should be performed within the ESCF while ensuring minimal contamination and minimal damage to the sample;
- Analogue Samples to determine which analogue proxies are necessary in a curatorial facility for testing sample handling, storage and preparation techniques;
- Portable Receiving Technologies to propose methods for the recovery and transport of samples from the landing site to the permanent curatorial facility.

Along with the scientific and technical requirements, the EURO-CARES project is also focussed on a high impact public engagement plan that engages children, university students, the general public and policy makers, as well as our academic and industrial peers. A significant risk to the development of an ESCF is the public perception of extra-terrestrial samples, potentially containing biological entities, being deliberately returned to Earth without going through the “sterilising” process of exposure to cosmic-rays and space environment. This could be of great concern to many people and could lead to major delays in the establishment of an ESCF. Hence, open communication is of great importance.

The planning of the facility design needs to start as early as possible (i.e., several years before the planned return sample date), ideally to finish the construction and interior design of the building at least one or two years before any sample return, to have enough time to properly test the facility on analogue samples and to train a dedicated team. Such a facility will have to preserve (and protect) samples for decades of research to be carried out on them, so its lifespan must be sufficient enough.